A Research Proposal of the Thesis Entitled

A Comprehensive study on Robotics Entrepreneurship in India and its Impact on the SME sector of India

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1. Introduction

'Robotics is software that is useful in completing particular task simply and easily'(Parihar, 2023).

'Robotics entrepreneurs are visionaries who see the potential of robotics to solve real-world problems, create new markets, and improve the quality of life of millions of people'- (Faster Capital, 2024).

The term 'ROBOT' can be elaborated as:

R for Random,

O for Optical,

B for Binary,

O for Oscillating,

T for Technology

The term 'ROBOT' came from a Czech word called 'ROBOTA' means 'Forced Labor' or 'Work'. In simple words, Robot is a machine, which can do work independently and automatically with human intervention. Czech writer Karel Capek introduced the term Robot for the first time in his book "R.U.R.: Rossum's Universal Robots" in the year 1920 (Gasparetto & Scalera, 2019).

Robots have myriad effects on today's world. Healthcare, education, agriculture, and manufacturing robots are taking place everywhere at a breakneck pace. Robots conjure the scenarios of futuristic machines but it already become a significant part of our world, from manufacturing and industrial robots to vacuum cleaners for homes. Robotics is a cross-disciplinary field that includes mechanical engineering, electronics engineering, computer science, artificial intelligence, design, management, etc. Robots are organized to do repetitive activities related to different sectors. From simple tasks to doing more complex one robots became successful from the beginning.

The term Robotics was coined in a Novel called 'Runaround' by Isaac Asimov in 1942(Gasparetto & Scalera, 2019) The term robotics is a multi-disciplinary analysis and

application of designing, constructing, operating, and utilization of robots for specific job purposes. The defined goal of Robotics is to help and assist the humans to make their work easier.

The history of robotics is greatly attached to the automation evolution, where primitive civilizations used dimple mechanical devices for practical purposes. Myriad effects can be seen in modern robotics technological advancement, for the need for effective, efficient, precision, and safety in different sectors and Industries. Robotics is now an integral part of manufacturing in various industries. It helps to boost productivity with unmatched speed and accuracy. Robotics can be explained as the Integration of sensors, actuators, and the control system. Sensors help robots to recognize their surroundings. Wherein, actuators help the robot interact with the actual world. "Essentially robots carry out three functions – they sense, think, and act – which forms the basis of their autonomy"(Mannan & Khurana,2012).

The concept of Entrepreneurship has generated increased passion and growth in society over recent decades, and with technical progress, it has also begun to spread across several domains. 'The term entrepreneur initially denoted an individual who is dynamic, venturesome, and perhaps aggressive'- (Thornton, 2019).

The concept of Entrepreneur came from the root 'entrepredre' means 'to undertake'. An entrepreneur is a person who identifies business opportunities in various sectors and industries. An entrepreneur sees a business opportunity and exploits it by establishing and running a business venture involving a fair amount of risk. Due to self-employment, organizational, and allocative competencies, entrepreneurs are usually innovative in their initiatives, ready to take risks, and flexible to discharge market forces. They are essential in the economy, considering that they offer impulses to innovation, employment, and growth. It is worth understanding that the sphere may be as diverse as to include technology, retailing or healthcare, manufacturing, and many others. While it is not mandatory to be huge organizations, they can actually build such organizations from a small-scale start. Entrepreneur has leadership qualities, and visions, and have the of being able to control people. Further, they should be great problem solvers especially when considering the management of a business entity. Altogether entrepreneurship is a fluid and critical factor for growth in any economy.

Merging Robot with Entrepreneurship introduced us to a new area called '*Robotics Entrepreneurship*'. Robotics entrepreneurship in India has now started coming up as a new

revolution especially in the SME's. Technological advancement is one of the most thriving trends in the contemporary business world and robotics in particular made significant and useful contribution in the Industrial revolution in India. Robotics entrepreneurship is the process of designing, implementing, and marketing robotics solutions, which may be offered by new or small and medium-sized enterprises, and the primary goal of which is to meet demand, reduce costs, and address industry needs. Since India has one of the largest SME sectors globally, integrating robotics with SMEs remains both a possibility and a challenge to create, enhance, and boost productivity and competitiveness. The global availability of state-of-the-art technologies like artificial intelligence (AI), machine learning, and IoT is one of the reasons for expansion of robotics entrepreneurship in India. These technologies are helping Indian entrepreneurs to design and develop unique robotic products required by SMEs to operate variety of industries ranging from manufacturing to agriculture, healthcare, logistics and more. For instance, manufacturing businesses that deal with SMEs are being assisted by robotics startups to embrace automation to create efficiency in manufacturing, eliminating wastage, and coming up with better quality products. Likewise in farming, robotics innovators are designing drones and other automatic equipment to complement accuracy farming, efficient usage of resources and boosting production. When discussed together with AI and IoT, robotics can be a game-changer for the SME sphere to become more effective on the global level.

Thus, there is wide acceptance of government-supported schemes and policies now forms the key driver for encouraging robotics businesses in India. The Indian government has followed an autocratic policy comprising of 'Make in India' and other policies that may help to uplift startups and SMEs to encourage robotics ventures. Also, funding facilitation like the Pradhan Mantri Mudra Yojana (PMMY) is supporting robotics businessmen to get more funding to grow their firms. Such policies are relevant mostly for the SMEs that may struggling with the costs associated with implementation of modern technologies. Thus, the Government helps SME's to make a link between robotics and the SME sector, to improve productivity, minimize costs, and look for new opportunities.

However, there are several challenges which are associated with robotics entrepreneurship in India and are more noticeable in SME sector. In this regard, one of the leading challenges is the costs mustered in the R&D process for robotics systems, which are likely to be very expensive for the small businesses. Further, absence of a skilled labor force in robotic as well as AI technologies obstructs automation in SMEs more. There are then factors such as

regulations, safety measures, and issues to do with displacement of employees by new technologies in business. Solving these challenges is cumulatively possible, imposing collective and joint efforts of the government, industry, and academia aimed at constructing an appropriate environment to support the progress of robotic systems.

Robotics entrepreneurship does not only affect the generation business opportunities but also significantly transform India's SME sector. Through such aspects as the simplification of monotonous procedures, increasing accuracy, and allowing small companies to expand their production capacities, robotics is making efforts to enhance the competitiveness of SMEs in the domestic and international levels. Moreover, if robotics is taken on as a business solution it can create jobs in higher levels of technology, thereby negating the effects of job elimination. Therefore, Robotics Entrepreneurship is one of the most profound areas of development for innovation, economic, and social development innovations for SMEs in India and it requires more investigation on the future.

Key Words: Robotics Entrepreneur, Small and Medium Enterprises, Impact of Robotics, Robotics Entrepreneurship, Production Cost, Productivity

2. Literature Review

Robotics entrepreneurship is rapidly on the rise all across the world and India is no exception as the country continues to grow its startup environment and technological expertise. New trends in robotics innovations thus can revolutionize conventional industries, especially SMEs employing new technology to boost their productivity and competitiveness. Since SMEs are a major contributor to employment and economic growth, adoption of robotic technologies steers several efficiency factors and productivity improvement as well as competitiveness. This could however be a potential area of research as comparisons of the effects of robotics entrepreneurship in the Indian SME industry can still be exploratory in nature. Thus, this literature review intends to revisit the existing literature about the state of evolution of robotics entrepreneurship in India and its consequences for SMEs. In its current form, technological adoption, market state, financial accessibility, and policy environments for robotics advancements will be examined in previous research. Thus, understanding enablers and barriers of SMEs adopting robotics and examining the general economic consequences is the aim of the review. The review also seeks to fill knowledge gaps in the field, especially in trying to understand what still needs to be done to drive the right type of robotics innovation, for

different SME industries in India, that would create sustainable growth and increased world market competitiveness.(Draft-National-Strategy-Robotics Government Innitiatives, Ministry of Electronics and Information Technology, Government of India,2023.)This executive summary Explains the Government initiatives taken by the Indian Government in Robotics. This draft explains India will develop robotics installation by 54% by 2021 and hold 10th position in for highest annual installation of Industrial robots. It explains how Robotic prioritizes Automation in India mainly in Manufacturing, Agriculture, Healthcare as well as National security. The Ministry of Electronics and Information Technology (MeitY) has formed which serves as a national agency of robotics. National Robotics Mission has been started. A four-pillar approach is adopted in the Indian Robotics Ecosystem. Apart from all of these Proper Training and Development have started.(Gasparetto & Scalera, 2019), in its discussion of a brief history of industrial robotics, mentions that the progress of industrial robotic applications has been classified into four generations from 1950 to the present. Industrial robotic development is an ongoing process, it is still progressing on the current days. New concepts and innovative perceptions of new hardware devices, along with some new programming techniques associated with modern AI, are changing the regular term notion, Industrial Automation is taking a brand-new life into the factory environment. (Nawaz, 2019)reviews the possibilities offered by modern artificial intelligence and robotics to modern entrepreneurship and how artificial intelligence and robotics is transforming entrepreneurship, contributing to its further development, increasing the rate of innovative solutions in various domains, as well as changing business-related processes as a whole to boost economic growth and people's quality of life.(Kamishima et al., 2018) explains the challenges and ethical considerations of merging AI with robotics entrepreneurship.(Kumar Adhana, 2021)describes the fourth industrial revolution from the Indian market aspect. This paper described Robotics as a part of the Industrial Revolution. The author provided a diagram to describe the whole process from Industry 1.0 to 4.0 journey. This paper described Robotics Process Automation, Autonomous robots, and big data as a part of the fourth industrial revolution. And showed how different sectors are improving with the help of Robotics in India.(Dhanabalan & Sathish, 2018) elaborated the utility of AI and robotics in different sectors of India in the sectors ranging from health care to agriculture to customer development. AI and Robotic became an Integral part of Industry 4.0. This paper explains the present scenario of the startups in India those taking advantages from AI and Robotics. It gave the roadmap of future policy planning for Robotics and AI. (Lévesque et al., 2022) brings out the application of AI in the field of entrepreneurship in terms of practical relevance and how AI can help improve the match

between theoretical knowledge and practical applicability, which is a key issue for entrepreneurship research. They suggest that engaging AI can make knowledge production for solving societal grand challenges more significant, notably, poverty and climate change. The authors also underscore the importance of the stakeholders to collectively direct their efforts in placing the field in an AI-relevant position that the authors illustrate with implementation pointers.(Mannan et al. & Khurana, 2012) focused on small and medium enterprises (SMEs) in India and the paper identifies the concerns and possibilities connected with robotics as an Advanced Manufacturing Technology (AMT). This reveals that despite the reality that SMEs are massive players in industrial manufacturing and employment, the robotics technologies remain unpopular among them. This is mainly because these technologies require large-scale production due to expensive with complicated interfaces. The growth of SMEs follows four stages: pre-start, initial start, pre-maturity, and Maturity, each of which presents different problems. Low capital, lack of awareness, and insufficient technical skills are some of the barriers discussed in the paper, which prevent the implementation of robotics. This means that there is a strong need for information and support for SMEs in order that they are in a position to grasp the advantages of adopting robotics as well as the best ways in which their adoption can be optimized. Finally, the paper urges that an effective initiative be developed to support SME's use of robotics to foster competitiveness. (Dirican, 2015) analyses effects of robotics and artificial intelligence (AI) as applied for business economics in the context of the new formed "Space Economy" after the financial crisis of 2008. It elaborates how technological revolutions including mechatronics and other forms of digital innovation are redesigning industries and modifying conventional industry structures. Such issues that the author discusses include the issue of joblessness as a result of increased automation by robots and artificial intelligence in activities that were traditionally done by low skilled human beings there is a paradox of low buying power and deflation. Moreover, the paper highlights the problem of new changes in the economy and management and how new theories in the management field should respond to these changes by asserting that organizations must embrace innovation to be competitive. All in all, (Dirican et al., 2015) is hopeful that the institution of these technologies will transform organizational forms and economic systems in the proximate future. (Matthew N. O. Sadiku et al., 2022)explain the use of robotics in different industries, focusing on the positive aspect of the role played by robots. The authors explain the benefits of robotics for production processes, for example, they speak about better productivity, safety and cost, since robots do not need to rest. However, the paper also looks at the various problems that exists in the implementation of robotic systems, including factors like job loss and obscene costs of

implementing the new systems. Periodization of this field shows positive trends, with expectations of major advancements in this aspect and the need for such systems in different sectors. The use of robots is predicted to increase with advances in their cost and capabilities within companies and businesses, which stem from their increasing demand for employees with robotics and automation technologies knowledge.(Kanekar, 2023)Using Artificial Intelligence (AI) and Robotics is the central theme of the paper where the author tries to portray the change that it brings into different sectors of India looking for the better growth rate and quality life. It also focuses on the government's programmes including Digital India as well as Make in India for the advancement of AI, which has directed monetary organisations to invest massively. The paper also discusses the main industries that are relevant to AI implementing – agriculture, healthcare, and manufacturing industries. Additionally, it talks about the necessity to address the problem of educational systems' lack of preparation of population for AI world economy, as well as considering the current state of educational services in AI as insufficient. Finally, the paper calls for an integrated strategy at the government-industry-academia interface to ensure the potential of AI technologies in the context of India is realized.

3. Problem definition and Research Gap

In this proposal entitled "A Comprehensive Study on Robotics Entrepreneurship in India and its Impact on the SME Sector of India" there exists a significant research gap in the term itself 'Robotics Entrepreneurship' and its specific influence on Indias SME sector. As the phenomenon of robotics entrepreneurship advances around the globe, most of the prior literature is located in the outset of the developed countries and the large-scale firms. These studies are mainly concentrated on the technological development progress, technological incubation systems, and market characteristics within the more developed economic systems. Complex processes of robotics entrepreneurship development in the context of the Indian SME segment, which is a significant driver of national economic growth, have not yet been deemed worthy of closer study. Despite, the interest in robotics entrepreneurship and the expansion of robotics across industries and geographies, the literature has not addressed how robotics entrepreneurship is playing out in the context of Indian SMEs. This is important because SMEs constitute a vital sector in India s economy by providing employment; and contributing to the economic growth. In this vein, the existing literature mostly reports technical operative improvements of robotics in manufacturing, healthcare, and industrial automation while lacking the investigation of the robotic entrepreneurship issues within the focus of Indian

SMEs. Much of the recent work has focused on technological use and advancement and technological enhancements but neglects Business and Entrepreneurship and the issues and opportunities inherent in robotics entrepreneurship in SME in a developing country context, such as in India.

4. Research Questions

I. What is the definition of Robotics Entrepreneurship? What are the types of Robotics Entrepreneurship in India?
II. What are the government initiatives to boost Robotics Entrepreneurs in India?
III. What are the challenges and opportunities for Robotics Entrepreneurship in the Indian market context?
IV. What are the impacts of Robotics entrepreneurs in India's SME sector? Do they rely on Indian Robotics Entrepreneurs?
V. What initiatives can be taken by the Robotics Entrepreneurs to increase robotics adoption in the Indian SME sector?

5. Need and Significance of the study

This research proposal on Robotics Entrepreneurship, created for our focus country's SME sector, is of great significance to India. It is with such importance that SMEs bear in India, specifically in providing for GDP, employment and exports, crucial to comprehend the advantages and pressures involved in implementing robotics technology into its operations to ultimately boost its international competitiveness and development.

This research proposal aims to explore the premise that robotics entrepreneurship has potential benefits to SMEs such as increasing productivity, cutting on operating costs as well as engineering enhanced levels of technological innovation. Demonstrating this impact would indicate that robotics might serve as a robust instrument to boost SME performance, increase production volume, and reduce expenses to improve their competitiveness in the domestic and international contexts. On the other hand, if challenges to robotics adoption such as high implementation costs or limited access to robotics for small companies are identified then the study can educate the policymakers about the need to provide incentives or subsidies to increase access and thus reduce the barriers to adoption.

It will present a quantitative analysis of the production cost-benefit of robotics adoption for SME. The accumulated information will enable SME owners to make rational decisions with regard to adopting robotics while taking into consideration possible benefits of doing so as well as possible costs.

In addition, with this proposal outlines the roles that funding sources, market needs, and government support have on robotics entrepreneurship. These observations are important for policymakers, investors, and all parties interested in building environments that encourage robotics implementation within SMEs. Also, innovative robotics can foster job enhancement and generation of new positions in SMEs which makes the overall concept critical when dealing with challenges arising from innovational advancement.

Overall, the contributions of this study are to help formulate and inform sustainable technology-oriented development strategies for SMEs in India that will enable their competitiveness in a digital and global environment.

6. Research Objectives

I. To comprehensively study robotics entrepreneurship in India and exploring the different aspects of robotics entrepreneurs from Indian business scenario.
II. To analyze the impact of robotics entrepreneurship on the SME sector of India.
III. To evaluate the government initiatives and exploring the opportunities and challenges faced by robotics entrepreneurs in Indian Market.

7. Hypothesis for Research Proposal

Due to the emerging competitiveness in the global markets, the SMEs' in India are pressured to undertake innovation in the technologies as a means of spurring productivity. In particular, robotics technology gives SMEs a unique opportunity to boost their performance, minimize human resource expenses and work on the continual improvement of product quality. Nonetheless, robotics integrated into SME sectors depend on different aspects.

This paper aims at identifying critical factors influencing robotics entrepreneurship success in India and its effects on the SME industry. The following hypotheses are proposed to establish the relationships between the above factors, and also to measure the impact of robotics adoption on SME. For this research, 3 tentative hypotheses have been selected.

Hypothesis 1

- Null Hypothesis (H0): Robotics Entrepreneurship has Negative Impact in Indian SME Sector.
- Alternative Hypothesis (H1): Robotics Entrepreneurship has Positive Impact in Indian SME Sector.

Hypothesis 2

- Null Hypothesis (H0): Robotics adoption Does not remarkably impact the Production rate in SMEs in India.
- Alternative Hypothesis (H1): Robotics adoption remarkably impact the Production rate in SMEs in India.

Hypothesis 3

- Null Hypothesis (H0): Robotics adoption Does not help to decrease the Production cost in SMEs.
- Alternative Hypothesis (H1): Robotics adoption helps to decrease the Production cost in SMEs.

8. Research Methodology & Data

This Research Proposal Propose a Mix-Method approach Research. The integration of Quantitative along with Qualitative approaches is planned to be conducted. It will give more holistic exploration to this Topic 'A Comprehensive study on Robotics Entrepreneurship in India and its Impact on the SME sector of India'.

Robotic Entrepreneurship preferably be investigated using mixed-method research because the two methods allow for the analysis of figures as well as interviews giving details of endeavors of the entrepreneurs. Since robotics is associated with technology, business, and innovation, a mixed method research approach can capture the essence of this field easily. Quantitative data gives information on robotic industry trends, the market size of robotic and production cost effect of robotic on SME. They can illustrate the tangible impact of robotics entrepreneurship on the rate of increase in production or decrease in costs or market share of the Indian SMEs. And the methods of qualitative approach may show the reasons, concerns and approaches of robotics entrepreneurs. By personal or textual methods of data gathering, as the interviews or case studies, one realizes the dynamics of entrepreneurship, the application of governmental policies or even the impact on implementation of robotics in business. It also allows for

triangulation; where qualitative results can either clarify or shed further light on quantitative results. For example, a quantitative study may reveal the Positive or Negative impact of robotics implementation in SMEs, but a qualitative may reveal why some firms perform better in implementing robotics. Additionally, a mixed-methods approach is not constrained in terms of the analysis process and can encompass the quantitative data on the extent of involvement of robotics entrepreneurs and SMEs, as well as the qualitative data concerning the potential influence of robotics entrepreneurship on SMEs. All in all, the proposed mixed-method approach allows for acquiring clearer and more comprehensive picture of the nature and development of robotics entrepreneurship in India, including both dynamics at the national level and details at the level of individual case studies. This is particularly useful in such a context as this, where other parameters like innovation, leadership and risk-taking matter just as much as numbers brought about by business operations.

8.1 Qualitative Research Plan

Robotics Entrepreneurs, Industry Experts and SME entrepreneurs will be selected for 'In-depth Interview' for the research. Along with it, Focus Group Discussion (FGD) will be held for this research to get sufficient knowledge. Inputs of the above analysis will then be used to prepare a Quantitative Research Plan.

8.2. Quantitative Research Plan

For this research proposal a 'Factor Analysis' is proposed. On the basis of analysis of Factors, A business model can be made to give an overview of this area.

8.3. Data Collection

To complete the research entitled 'A Comprehensive study on Robotics Entrepreneurship in India and its Impact on the SME sector of India' both the Primary data and secondary data is planned to collect.

8.3.1. Primary Data

Primary data is planned to collect from the Robotic Firms, Robotics Entrepreneurs, Industrial Experts, SME Entrepreneurs.

8.3.2. Secondary Data

Secondary data will be collected through Research papers, Websites, Blogs, Books etc.

9. Visible Research Outcomes

The outcomes of this study on robotics entrepreneurship in India's SME sector are expected to be revolutionary and informative. First, this research should uncover that incorporating robotics inside SMEs might result in a remarkable boost in productivity because, with the use of automation, business proceedings will become more efficient. The use of robots in Robotics technology enables various time-consuming and laborious processes, thus increasing productivity, cycle time, and quality assurance. These efficiencies could assist SMEs to better compete on two fronts, domestic and open, in their operation. Since the standards for continuing to compete on the international level are high, robotics-improving quality and productivity would give SMEs a key advantage and enable them to strengthen their positions in the markets and cover the modern needs of consumers.

Besides increasing productivity, the other expected performance improvement is on the operational and production costs. Robotic process automation can reduce the involvement of manpower by considering numerous operations that are expensive and tedious. From the monetary point of view, SMEs can feel direct benefits in terms of minimized risks due to the human factor, lower costs of the production. Across these industries, companies exploring the use of robotics automation are able to re-focus their sources, direct additional capital toward growth, research, or market penetration. This shift doesn't only help SMEs to get the most out of their funds, but also to transfer personnel thus boosting productivity within the company and possibly creating new product concepts.

This study will also reveal the key difficulties and constraints that SMEs face in implementing robotics. Some of the difficulties typical of robotic manufacturing include; the expensive of robotics technology with small businesses, which may not afford to pay for such expensive technology. It is also important to note that because of the initial capital costs needed for the implementation of a robotics system, many SMEs may not be able to readily adopt the technologies, despite the clear long-term returns that come with automation.

Especially the unavailability of skilled employees for certain sectors such as robotics, AI, or machine learning also poses a significant risk since small and medium-sized enterprises might have no access to the qualified staff needed for operating and maintaining those complex

systems. Also, there are always regulatory issues and the risk of job loss which are also a concern to bother some businesses and Entrepreneurs.

The research will hope to find that bureaucratic policies, including 'Make in India,' would be instrumental in promoting robotics entrepreneurship for SMEs. It is envisaged that a number of policies undertaken by the governments in different countries, such as the provision of financial incentives, training as well as regulatory solutions, shall likely be deemed as being crucial enablers in an attempt to narrow the gap created by high costs of robotics technology targeting SMEs with low financial capacity. Currently, promoting robotics as a manufacturing tool might prove difficult and expensive for SMEs, therefore, with governmental support more firms could move towards applying robots, thus ultimately improving the technological and economical standing of the nation. Settings of cooperation with educational establishments and skill development programs could become the focal characteristics of the environment supporting SMEs that integrate robotics into their business processes.

This study will represent an integration of Robotic technology and Entrepreneurship in India. During the review of Literature, the topic itself was discovered as a Research Gap.

The proposed study to be titled, A Comprehensive Study on Robotics Entrepreneurship in India and its Impact on the SME Sector of India, seeks to fill a research gap specifically, on the wedge between robotics and entrepreneurship in the SME industry of India. With robotics now advancing into many industries globally, SMEs in India are at a cross-road of adapting these technologies to boost their operations' efficiency, cost-reduction and competitiveness. But challenges are numerous like high implementation costs, shortage of skill labor, and the problems associated with using advanced robotic tools and technologies. Consequently, this research aims to explore the state of Robotics Entrepreneurship within the Indian SME environment to evaluate the related consequences, examine the facilitating and hindering conditions, and outline recommended strategies and policies for the effective execution of robotics entrepreneurship.

A major implication expected in this research is that robotics entrepreneurship can work wonders for the SMEs of India; especially in manufacturing, agriculture, and logistics industries where automation can be extremely beneficial in reducing human effort and increasing productivity. This is likely to make SMEs more competitive in local and export markets and therefore supply a powerful impetus to overall economic development in India.

Using the findings from the surveys and interviews, pattern matching the qualitative and quantitative data obtained from the calculations of productivity enhancement and relative costs reduction this work will try to use numbers and measurements to explain how robotics could be an advantage to SMEs in today's technological world.

The research also recognizes the fact that the pursuit of robotics entrepreneurship comes to structural region in India. One of the reasons why many SMEs employing robots is a challenge is because their budgets are normally small and robotics is expensive to install initially. Moreover, a scarcity of qualified human capital to pursue robots, including artificial intelligence and learning, makes combining these innovative solutions even more challenging. Pain points also include regulatory problems and apprehension with relation to job losses and have the potential of limiting adoption. Overcoming these barriers is the purpose of the research as the study will provide recommendations for SMEs as well as the governmental policy on how to incorporate robotics into the companies' structures.

Ultimately, this study expects that the adoption of robotics entrepreneurship can reveal fresh opportunities for the development of SMEs in India based on innovation, growth, productivity, and the formation of groundwork for progressive advancing of technologies in the country. Significantly, these advantages are expected to accrue only when favorable polices are put in place to reduce the entry barriers and the existing skills imbalance. This research will give a detailed synopsis of the Effects, Barriers, and Facilitators of robotics entrepreneurship for Indian SME's along with a tactical plan for improving the advancement of robotics for the sustainable growth of SMEs. The anticipated contributions of this research are multi-faceted: ensuring SME owners learn the importance of implementing Robotics, ensuring policymakers learn the changes they need to make, and generally ensuring there's a discourse to help emerging markets understand how Technology can revolutionize their economy. Finally, the research would be valuable in building a long-term resilient, technology driven SME sector in India that will help bring in economic and social reforms in an escalating global environment.

In conclusion, it is believed that the study will help demonstrate a clear vision and direction towards enhancing Robotics Entrepreneurship in Indian SMEs and SMEs globally as well as to the different investors interested in the enhancement of technology in the Indian SMEs. The outcomes could portray robotics for enhancing the SME business productivity, proficient and cost-effective, to enhance India's stature in the global sphere. These results will highlight the impact that robotics entrepreneurship can impose on the SMEs to pave ways to sustainable

growth, better productivity, and the enablement of a more competitive technological SME sector in India.

10. Tentative Chapter Plan

Chapter No.	Chapter Name	Sub Chapters
1	**Introduction**	1.1. Background of the Study 1.2. Overview of SME sector in India and its significance 1.3 Statement of problem 1.4 . Research Questions and Hypothesis
2	**Literature Review**	2.1. History and Historical evolution of Robotics Entrepreneurship 2.2. Enablers and Barriers in India 2.3. Review of Government Policies and initiatives and support schemes for Robotics Entrepreneurs in India 2.4. Identifying a Research Gap that can be addressed through this study
3	**Research Methodology**	3.1. Justification of using Mixed- Method Approach 3.2. Selection of sample and Data Collection Technique
4	**Analysis and Findings**	4.1. Analysis of Quantitative data 4.2. Qualitative Interviews of the robotics entrepreneurs and SMEs. 4.3. Exploration of the influence of robotics in the area of small and medium enterprises

		productivity, cost and efficiency gain, and competitiveness.
5	**Discussion**	5.1 Discussed the consequences of the findings for robotics entrepreneurship and SMEs in India. 5.2 Review of policy considerations and recommendations on enhancing robotics take-up among SMEs.
6	**Conclusion and Recommendations**	6.1 Summary of Findings 6.2 Practical Recommendations of SMES 6.3 Limitations of the study 6.4 Future scope of the study
7	**References**	7 Bibliography of all the references

11. Limitations of this Study

The Following mentioned points can be limitations of this Research:

i. **Limited Access to Secondary Data:** Data of sector wise, and region wise integration of robotic in SME 's of India are not available in details and hence may affect the extent and depth of analysis.

ii. **Technological Advancements:** The findings may be quickly overtaken by events and new innovations in Robotics and fields closely related to Robotics could easily make specific research findings look dated, therefore questioning the applicability of conclusions made on the research.

iii. **Sectoral Variability:** Simply, the extent of robotics implementation is not the same across all SME sectors; therefore, findings cannot be generalized to all industries.

iv. **Financial Constraints:** The result is that many SMEs simply do not have the financial backing to invest in robotics technology or the associated potential solutions and recommendations.

v. **Skilled Workforce Availability:** This aspect remains a major one though it comes with a silver lining; there is a dearth of qualified workforce experienced in the field of robotics,

artificial intelligence, and IoT; or for that matter any facet of smart technologies; which affects the empirical implementation of research studies and outcomes.

vi. **Policy Limitations:** Considering the impact of fiscal and technological policies on robotics entrepreneurship in SMEs, bureaucratic factors could hamper the translation of research recommendations to practice.

vii. **Resistance to Change:** Some of the SME's may resist to adopt robotics due to the effects that the machines may bring such as loss of job opportunities; others may consider it an expensive investment making the implications of this research restricted.

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